

Trade Credit and Exchange Rate Risk Pass Through

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 - ▶ 88% of short-term liabilities for median firm in 8 EMs during 2009-2019 (Orbis)
 - ▶ Financed by FX debt (Hardy and Saffie, 2023) → balance sheet shocks

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1. Model trade credit along supply chains in presence of FX shocks

- ▶ Key feature: trade credit supply depends on firm ability to borrow from bank
- ▶ Result: financial constraint governs degree of FX pass through via trade credit

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- 1. Model trade credit along supply chains in presence of FX shocks**
 - ▶ Key feature: trade credit supply depends on firm ability to borrow from bank
 - ▶ Result: financial constraint governs degree of FX pass through via trade credit
- 2. Validate model with data for 11K+ large firms in 19 EMs for '00-'20 (Capital IQ)**
 - ▶ Non-exporters pass on 30% of decline in profits to trade credit partners

Invoicing currency and hedging:

- ▶ Amiti et al. (2022, QJE), Lyonnet et al. (2021, JMCB), Alfaro et al. (2021, WP), Barbiero (2022, WP), Cui et al. (2022, WP)

Currency choice of debt and FX balance sheet shocks:

- ▶ Salomao and Varela (2021 ReStud), Kim et al. (2015 JIE), Hardy (2018, WP), etc.

Recent theory of trade credit in macro:

- ▶ Giannetti et al. (2021, JPE), Hardy et al. (2022, WP), Shao (2020, WP), Reischer (2020, WP), Bocola and Bornstein (2023, WP), Mateos-Planas and Seccia (2021, WP), Miranda-Pinto and Zhang (2022, WP), Esposito and Hassan (2023, WP), Cui et al. (2022, WP)

Empirical evidence of trade credit as stabilizer:

- ▶ Amberg et al. (2021 JPE), Garcia-Appendini and Montoriol-Garriga (2013 JFE), Adelino et al. (2022 RFS), Ersahin et al. (2022 WP), Hardy and Saffie (2022 WP)...

Data is derived from Capital IQ

- ▶ Primary dataset: Financial information for mostly large firms (both listed and private)
- ▶ Separate capital structure dataset: details liability sources, including a currency breakdown \Rightarrow Match to over 95% of sample
- ▶ Separate geographic exposure dataset: details on source/location for revenues and assets \Rightarrow Match to over 85% of sample

Sample:

- ▶ 19 EM economies
- ▶ 11K+ firms over 2000q1-2020q4

Trade Credit and Debt for Large Firms

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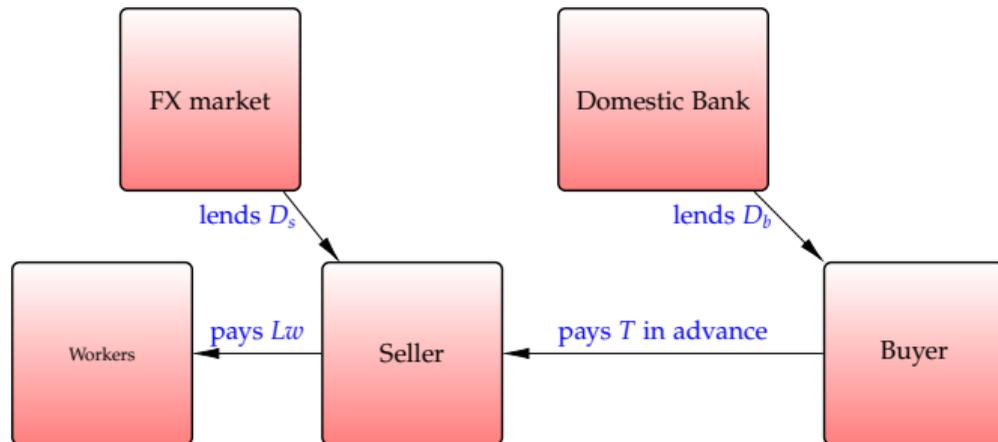
- ▶ TC is 1/3 of short-term liabilities for 11K+ large firms
- ▶ Net lenders: $(AR - AP) / Assets = 7\%$
- ▶ Have higher share of debt in FX
 - ▶ 23% of total debt in FX for average firm, 94% for 90th %tile
 - ▶ $\text{Corr}(\text{FX debt share, log assets})=0.27$

Model: Basics

We develop a simple general equilibrium model of borrowing, production, and trade credit

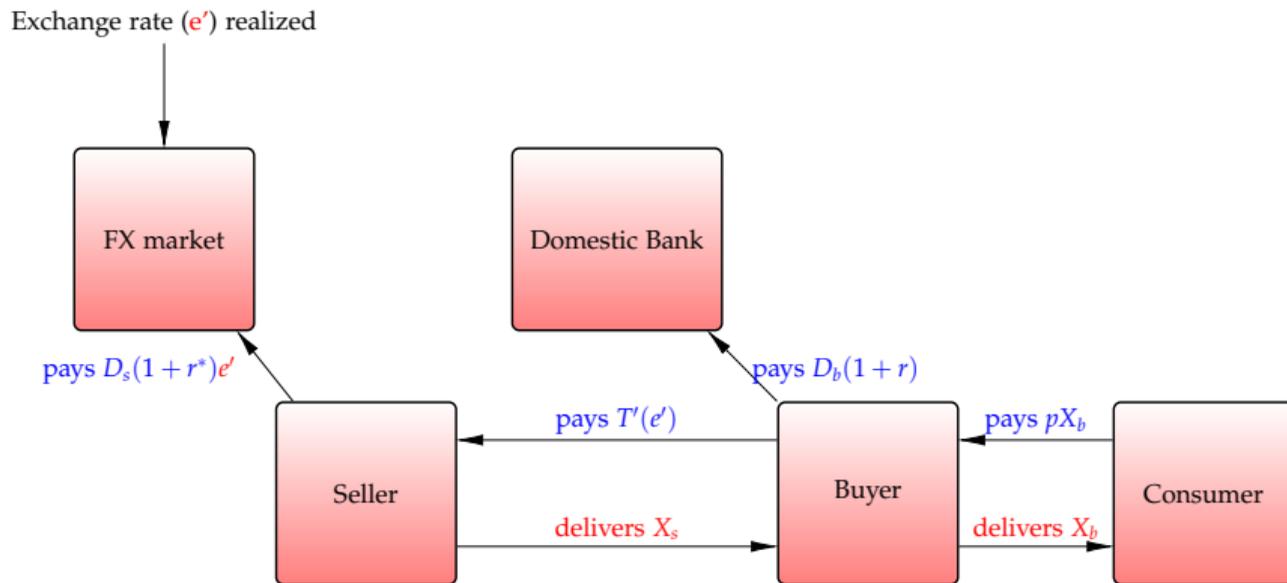
- ▶ Small open economy, two periods, exchange rate uncertainty re $t=2$
- ▶ **Two main agents:** large intermediate goods supplier (**seller**) and small final goods producer (**buyer**)
- ▶ Firms need to **borrow externally** in order to produce
- ▶ Firms face **credit constraints** (quadratic borrowing cost)
- ▶ Extending **trade credit can help loosen that constraint** and allow scale to increase
- ▶ Large suppliers can **borrow in foreign currencies**
 - ▶ They are subject to exchange rate risk
- ▶ Trade credit terms are decided
 - ▶ Can decide **how much of exchange rate risk to pass on** to buyer
 - ▶ Volume of trade credit also impacted by external borrowing costs

Model with Trade Credit 1



- ▶ T are accounts payable for the seller (payment prior to the delivery of the goods). The buyer is giving trade credit.

Model with Trade Credit 2



- ▶ T are accounts payable for the seller (payment prior to the delivery of the goods). The buyer is giving trade credit.
- ▶ $T'(e')$ are accounts receivable for the seller (payment after the delivery of the goods). The seller is giving trade credit.

Model Implications

Solution to model includes a number of cases, 2 main categories:

- ▶ Unconstrained seller
- ▶ Constrained seller

Key observations:

Trade credit lending requires more debt by the seller but yields higher scale

- ▶ **Prediction:** Larger, more profitable (less constrained) firms with more debt extend more trade credit

Unconstrained seller, trade credit does not change with e'

- ▶ **Prediction:** No pass through of shock via trade credit, hit to seller profits

Constrained seller, trade credit changes with e'

- ▶ **Prediction:** Imperfect pass through of shock via trade credit

Trade Credit Supply and Firm Characteristics

$$AR_{icst} = \alpha_i + \alpha_{cst} + \beta_d Debt_{icst} + \beta_s Sales_{icst} + \beta_p Profits_{icst} + \beta_r IR_{icst} + \zeta X_{icst} + \epsilon_{icst}$$

- ▶ **Model:** Larger, less constrained firms with higher debt lend more through their supply chains.

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- **Model:** Larger, less constrained firms with higher debt lend more through their supply chains.

	(1)	(2)	(3)
ST Debt _{it}	0.0680*** (0.00296)	0.0640*** (0.00268)	0.0318*** (0.00198)
Profit _{it}	0.294*** (0.0122)	0.258*** (0.0143)	0.0888*** (0.00797)
Sales _{it}	0.160*** (0.00394)	0.153*** (0.00436)	0.150*** (0.00458)
Low IR _i		0.00436*** (0.000596)	
Acc Pay _{it}	0.443*** (0.00888)	0.452*** (0.00926)	0.272*** (0.00577)
Observations	201465	169262	200615
R ²	0.411	0.427	0.820
CountryIndustryTimeFE	Yes	Yes	Yes
FirmFE	No	No	Yes

Dependent variable is accounts receivable relative to assets, winsorized at 1%. Controls include short-term debt (excluding accounts payable), profits, sales, accounts payable, cash, and inventories, all normalized by assets and winsorized at 1%; and log(assets), and in column 2 a dummy capturing if the firm's average interest rate on external debt is below the country-industry average for either local currency debt or foreign currency debt. R² is adjusted R². Errors are clustered at the industry-year level. * p < 0.10, ** p < 0.05, *** p < 0.01

XR Risk Pass Through: Empirical Strategy

- ▶ **Model:** Pass through of shock to firm balance sheet depends on financial constraint
- ▶ Balance sheet shock is interaction of exposure with home depreciation:

$$FXExposure_{it} = \frac{FXL_{it} - FXA_{it}}{Assets_{it}}$$

- ▶ Exporters have natural hedge → split firms into X (if $X > 20\%$) and NX
- ▶ Model for trade credit providers ($AR-AP > 0$) → split firms into net providers/recipients
 - ▶ Robustness: group firms into sectors by net trade credit provision
- ▶ Financial constraint: dummy if firm mean $>$ country-industry mean for short-term debt (excl. AP), profits, sales (all relative to assets); ($<$) interest rate on FC/LC debt

$$Y_{icst} = \alpha_i + \alpha_{cst} + \gamma_1 FXExposure_{it-1} + \gamma_2 FXExposure_{it-1} \times XRDepr_{ct} + \\ \gamma_3 FXExposure_{it-1} \times Type_i + \gamma_4 XRDepr_{ct} \times Type_i + \\ \gamma_5 FXExposure_{it-1} \times XRDepr_{ct} \times Type_i + \epsilon_{icst}$$

XR Risk Pass Through and Profits

► **Model:** Exposed firms decrease profits

			Exporters	Non-exporters	Net TC Lender		Non-exporters
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
FX Exposure _{it-1} × XR Depr _t	-0.112*** (0.0198)	-0.244*** (0.0394)	-0.0642*** (0.0211)	-0.248*** (0.0413)	-0.103*** (0.0181)	-0.235*** (0.0425)	-0.136*** (0.0448)
FX Exposure _{it-1} × XR Depr _t × Exporter _i		0.178*** (0.0360)				0.180*** (0.0397)	
FX Exposure _{it-1} × XR Depr _t × Lender Industry _s							-0.248*** (0.0779)
Observations	171083	171083	39327	129607	133695	133695	129607
R ²	0.4063	0.4067	0.4339	0.3987	0.3204	0.3207	0.3989
CountryIndustryTimeFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Dependent variable is profits relative to assets, winsorized at 1%. Independent variables include (FX Debt - Foreign Assets)/Assets, winsorized at 1%, and lagged one quarter; the quarter on quarter depreciation rate of the period average exchange rate; dummies for if the firm is an exporter (foreign revenue/total revenue > 20%) or in a sector with high average accounts receivable relative to accounts payable (Manufacturing, Services, Construction, and unclassified firms); and the interaction of these variables. Column (3) includes just exporting firms. Columns (5) and (6) include just firms that on average have accounts receivable > accounts payable. Columns (4) and (7) include just non-exporting firms. R² is adjusted R². Errors are clustered at the industry-year level. * p < 0.10, ** p < 0.05, *** p < 0.01

XR Risk Pass Through to Trade Credit

- **Model:** Exposed firms do not decrease trade credit lending if unconstrained

	All		Exporters	Nonexporters		
	(1)	(2)	(3)	(4)	(5)	(6)
FX Exposure _{it-1} × XR Depr _t	-0.0201 (0.0174)	-0.0706* (0.0367)	0.00571 (0.0241)	-0.0771** (0.0378)	-0.108*** (0.0383)	-0.137** (0.0581)
FX Exposure _{it-1} × XR Depr _t × Exporter _i		0.0664 (0.0425)				
FX Exposure _{it-1} × XR Depr _t × Top 25% TC Lender _i					0.267* (0.152)	
FX Exposure _{it-1} × XR Depr _t × Lender Industry _s						0.137* (0.0746)
Observations	167432	167432	39306	125978	125293	125978
R ²	0.7877	0.7877	0.7603	0.7928	0.7928	0.7928
CountryIndustryTimeFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes

Dependent variable is accounts receivables relative to assets, winsorized at 1%. Independent variables include (FX Debt - Foreign Assets)/Assets, winsorized at 1%, and lagged one quarter; the quarter on quarter depreciation rate of the period average exchange rate; dummies for if the firm is an exporter (foreign revenue/total revenue > 20%), has on average more accounts receivable than accounts payable, has average accounts receivable less accounts payable in the top quartile, or in an industry with high average accounts receivable relative to accounts payable (Manufacturing, Services, Construction, and unclassified firms); and the interaction of these variables. Column (3) includes just exporting firms (foreign revenue/total revenue > 20%). Columns (4)-(6) include just non-exporting firms. R² is adjusted R². Errors are clustered at the industry-year level. * p < 0.10, ** p < 0.05, *** p < 0.01

XR Risk Pass Through and Financial Constraints

- **Model:** Exposed firms decrease trade credit lending more if constrained

	(1)	(2)	(3)	(4) Excl. Top Lenders	(5) Excl. Lender Industries
FX Exposure _{it-1} × XR Depr _t	-0.123** (0.0490)	-0.0929* (0.0543)	-0.135 (0.0829)	-0.170* (0.0891)	-0.257** (0.127)
FX Exposure _{it-1} × XR Depr _t × High ST Debt _i	0.0867* (0.0474)		0.106* (0.0586)	0.0685 (0.0619)	0.205** (0.0825)
FX Exposure _{it-1} × XR Depr _t × Low IR _i		0.000121 (0.0619)	0.0598 (0.0687)	0.135** (0.0610)	0.192** (0.0898)
Observations	123015	104156	100288	76757	42382
R ²	0.7952	0.7943	0.7946	0.7327	0.8286
CountryIndustryTimeFE	Yes	Yes	Yes	Yes	Yes
FirmFE	Yes	Yes	Yes	Yes	Yes

Dependent variable is accounts receivables relative to assets, winsorized at 1%. Independent variables include (FX Debt - Foreign Assets)/Assets, winsorized at 1%, and lagged one quarter; the quarter on quarter depreciation rate of the period average exchange rate; and dummies for if the (winsorized) firm average is greater than the country-industry average for the following variables: short-term debt to assets (excluding accounts payable), profits to assets, sales to assets, and (dummy for below average) interest rate on foreign or local currency debt. Sample includes just non-exporting firms (foreign revenue/total revenue > 20%). Column (4) excludes firms in the top quartile of average accounts receivable less accounts payable. Column (5) excludes firms in industries with high average accounts receivable relative to accounts payable (Manufacturing, Services, Construction, and unclassified firms). R² is adjusted R². Errors are clustered at the industry-year level. * p < 0.10, ** p < 0.05, *** p < 0.01

Showed theoretically and empirically that:

- ▶ Firms trade off debt and trade credit
- ▶ Larger, less financially constrained firms that borrow more extend more trade credit
- ▶ Large firms tend to absorb balance sheet shocks rather than passing them through via trade credit
- ▶ Firms pass through balance sheet shocks more when financially constrained

FX financing is important for many EMs, generating FX risk!

- ▶ Firms might slow the propagation of shocks to their supply chains via trade credit
⇒ shock absorbing role